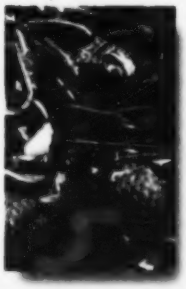

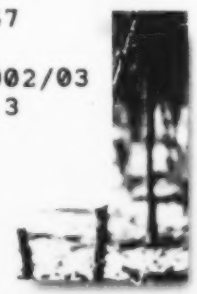

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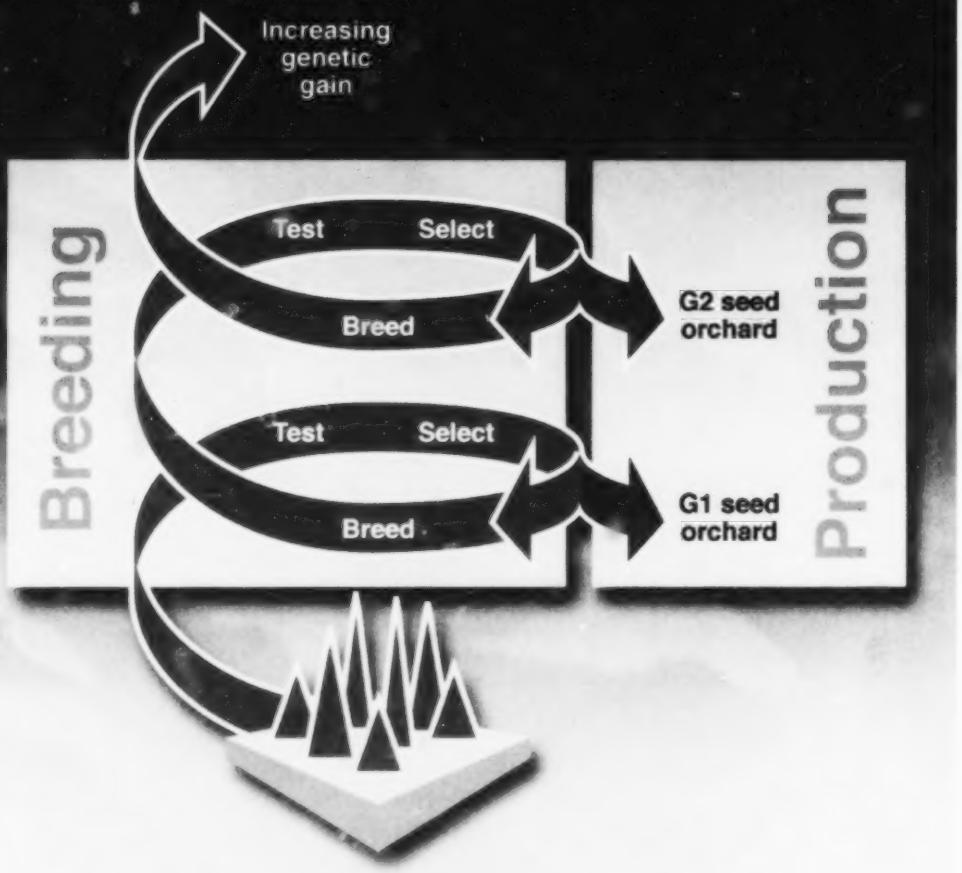

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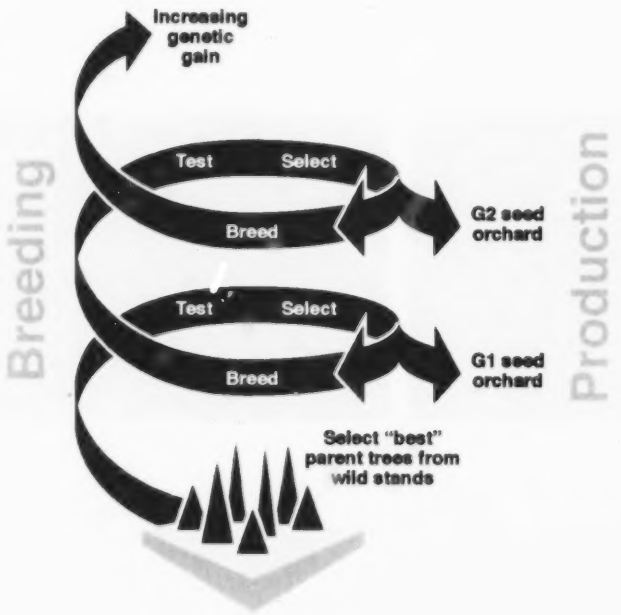
Cover Figure
Tree improvement is a continual process of selection, testing, and breeding to increase the extent to which each generation of improved seedlings exhibits desirable traits - the "genetic gain".

(from FGC Extension Note 2,
***Biotechnology: Potential Applications in Tree Improvement*)**



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Acknowledgements

This Annual Report presents the 2002/03 achievements of the many people involved with tree improvement and forest genetics in British Columbia.

The members of the Forest Genetics Council and its Technical Advisory Committees deserve credit for their careful deliberations and support. They are listed on the back page of this annual report.

The Chairs of the Technical Advisory Committees deserve special acknowledgement for their efforts. They are: Sally Aitken (Coastal TAC), Mike Carlson (Interior TAC), Dale Draper (Gene Conservation TAC), and Chris Hawkins (Extension TAC).

FGC Co-Chairs Shane Browne-Clayton and Dale Draper are thanked for their guidance throughout the year.

My appreciation also goes to Roger Painter (MOF Goals Agreement Program Administrator), and to Jordy Tanz of Cortex Consultants Inc. (FGC Secretariat).

Finally, the support and guidance of Larry Pedersen (Provincial Chief Forester), and Ken Baker (Deputy Chief Forester) is instrumental in keeping this program on track. My thanks for their important contributions.

JACK H. WOODS
PROGRAM MANAGER
FOREST GENETICS COUNCIL
OF BRITISH COLUMBIA

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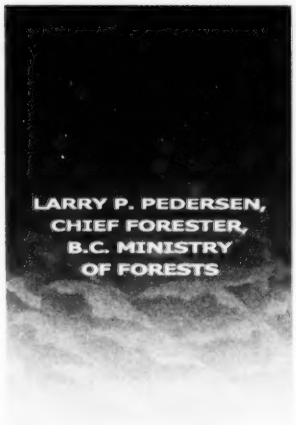
Message from the Chief Forester



LARRY P. PEDERSEN, CHIEF FORESTER, B.C. MINISTRY OF FORESTS

Once again I am pleased to participate in the Annual Report of the Forest Genetics Council of BC (FGC), and I congratulate Council on a clear presentation of performance indicators and spending at the project and provincial levels.

The 2002/03 fiscal year is the first for the Forest Investment Account Tree Improvement Program (FIA TIP). I am pleased to note that the effective business practices set up by the FGC during the Forest Renewal BC era allowed a smooth and seamless transition to the FIA funding source. These same business practices have also generated considerable support for tree improvement and given FIA decision makers confidence in Council's ability to produce results.

A great deal of work is represented in this Annual Report, and I would like to recognize not only Council, but also members of the Technical Advisory Committees that support Council's work. Their effort to provide effective and detailed planning and coordination is critical to the success of the program. It is the cooperation and effort of individuals that make a program work, and it is clear that cooperation and enthusiasm are high in this program.

A very significant milestone was reached during the period of this report. Beginning in 1998 with the setting of clear objectives, followed by careful analyses through species plans, Council identified the amount of provincial seed orchard capacity needed. Meeting the organizational challenge to find a means to develop this capacity was accomplished when Council set up SelectSeed Company Ltd. This initiative has now successfully entered into long-term seed orchard agreements for the establishment of 14 new orchards; increasing total provincial capacity by nearly 30 percent. These expansions effectively complete the orchard development needed to meet FGC seed production objectives, and I applaud both Council and the SelectSeed Board of Directors for passing this key milestone.

The past several years have been ones of great change in the forestry industry, and I expect the accompanying challenges to continue. Implementation of new forest policy, combined with challenging economic times in the industry, means the near-term future is likely to differ considerably from the past and present. Two strong fundamentals are likely to remain important: an effective business case, and attention to stewardship. Continued focus by the Tree Improvement Program on these fundamentals, combined with a proven record of effective implementation, will strongly support future tree improvement investment.

In closing, I would like to recognize three people who have recently retired; Dr. John Barker of the University of BC, and Drs. Cheng Ying and Joe Webber of the MOF Research Branch. Their experience, enthusiasm, and collective wisdom will be greatly missed in the provincial tree improvement program, and I thank them for their important contributions. I would also like to acknowledge the significant contribution that Jordan Tanz has made in his longstanding role as FGC secretariat.

Message from Forest Genetics Council Co-Chairs

SHANE BROWNE-CLAYTON
INDUSTRY CO-CHAIR

DALE DRAPER
MINISTRY OF FORESTS
CO-CHAIR

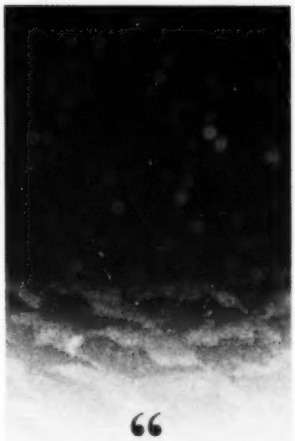
First and foremost we would like to recognize and sincerely thank the many industry and government staff who contribute to the provincial Tree Improvement Program for their cooperation and dedication over the past year. Although forestry in BC is changing quickly, there is a consistent and solid base of support, and a well established business planning process in place for the provincial Tree Improvement Program.

During the 2002/03 fiscal year, substantial progress was made in several important areas:

- *SelectSeed Company Ltd. orchard developments added nearly 30% to provincial seed orchard capacity, and have allowed the provincial program to reach the critical milestone of having sufficient seed orchard capacity to meet provincial objectives.*
- *The lodgepole pine breeding program, under the leadership of Dr. Michael Carlson of the Ministry of Forests, met the challenge of selecting parents and producing sufficient scion to allow SelectSeed Co. orchard developments to proceed. The Pli team deserves great credit for this achievement.*
- *The smooth transition from Forest Renewal BC to Forest Investment Account support for tree improvement was made possible by the effective business planning and skilled delivery of all cooperators.*
- *The Centre for Forest Gene Conservation at the University of BC completed an initial cataloguing of tree gene resources in BC, and has facilitated important discussion on gene conservation issues.*

The coming year will be an interesting and challenging one for the Forest Genetics Council, as we work through the development of a new strategic plan. This new plan will set out a framework for the next 5 to 10 years, and is a critical element to long-term program success. Continuing changes in provincial forest policy, and the need to increase incentives for tree improvement activities on Crown lands will be key items of focus for the strategic planning effort. In addition, some new members will join Council in the coming year as membership is reviewed and changed. We look forward to the fresh ideas from the new members, and we sincerely thank outgoing councilors for their dedication and hard work on behalf of Council and the provincial Tree Improvement Program.

1.0 Forest Gene Resource Management in British Columbia



"Forest gene resource management is a cooperative endeavour involving the forest industry, government, universities, and consultants."

Forest gene resource management encompasses the conservation, controlled use, and enhancement of genetic resources of forest tree species, and related communication and extension activities.

Forest gene resource management is a cooperative effort. The Forest Genetics Council of British Columbia (FGC) coordinates a provincial forest gene resource management program that is implemented by stakeholders in the forest industry, Ministry of Forests (MOF), Canadian Forest Service (CFS), and universities.

In broad terms, the MOF leads tree breeding activities and private industry leads operational production of reforestation materials. The CFS, MOF Research Branch, and universities undertake research supporting tree improvement, while private institutions focus on applied research related to operational production. The University of British Columbia (UBC) leads gene conservation activities, with input from all cooperators.

During the term of this report, the provincial Forest Investment Account Tree Improvement Program (FIA - TIP) was a major funding source for forest gene resource management in British Columbia. Industry, MOF, and university cooperators also contributed substantial resources.

This annual report describes progress on work outlined in the FGC Business Plan for 2002/2003. The Business Plan and this Annual Report focus on TIP funding, although performance indicators used at both the project and provincial levels represent the combined effort of all cooperators and resources.

The report consists of five main sections. Section 1 presents an overview of the provincial program. Section 2 reports TIP budgets and expenditures, as well as progress by performance indicators. Section 3 describes progress towards FGC provincial objectives. Section 4 summarizes cooperator activities. Section 5 highlights challenges facing Council in the year ahead.

1.1 Forest Genetics Council of British Columbia

"The Forest Genetics Council represents the B.C forest industry, Ministry of Forests, and universities."

The FGC is a multi-stakeholder group representing the forest industry, MOF, and universities. Council's mandate is to champion forest gene resource management, to oversee strategic and business planning for a cooperative provincial forest gene resource management program, and to advise the province's Chief Forester on policies related to forest gene resource management.

The Council provides a forum for stakeholder representatives to set goals and objectives, and to oversee the development and delivery of business plans to fulfill them.[1]

As set out in its 1998 Strategic Plan, Council's goal is:

To maximize the economic benefits from tree improvement investments for gains in wood quality, quantity, and pest tolerance consistent with strategic land use planning by:

- *managing a gene conservation program to maintain genetic diversity in commercial tree species*
- *identifying and funding the long-term production capability required to meet approved Business Plan priorities*
- *doubling the average volume gain of select[2] seed produced from 6% to 12% by 2007*
- *increasing select seed use to 75% of total provincial sowing by 2007*
- *monitoring progress in all aspects of gene resource management.*

Business Planning

"Council's Technical Advisory Committees lay the groundwork for the annual FGC Business Plan."

The annual FGC Business Plan outlines the activities and budgets of the seven subprograms that constitute the provincial forest gene resource management program.

FGC Technical Advisory Committees (TACs) provide technical and policy information to Council and contribute to the development of annual plans and associated budgets to achieve FGC goals and objectives (Figure 1).

- The Gene Conservation TAC (GCTAC) advises Council on issues related to gene conservation and genetic diversity, and identifies required activities and budgets.

[1] For more information on the Forest Genetics Council, see http://www.fgcouncil.ca

[2] "Select" describes seed and vegetative material having a level of genetic gain (GW>0). All see and vegetative lots derived from orchards and production facilities (genetic Class A) and superior provenances (genetic Class B+) are considered to be select.

- The Coastal and Interior TACs, through their Species Committees, prepare Species Plans that estimate seed demand, production capacity, and genetic gain for each of the 42 seed planning units (SPUs)[1] in the provincial forest gene resource management program.
- The Extension TAC (ETAC) advises Council on communication and extension issues, and develops an annual activity plan for the Extension and Communication Subprogram.
- The Gene Resources Information Management Steering Committee prepares plans and advises Council on investments in improved systems for registering seedlots, tracking seed use, and providing information on the use and availability of seeds.

Each committee identifies priorities, and evaluates and ranks proposals and projects for funding through the Business Plan. council reviews all strategies, plans, or recommendations from the TACs or other agencies for approval (or revision) before including them in the FGC Business Plan.

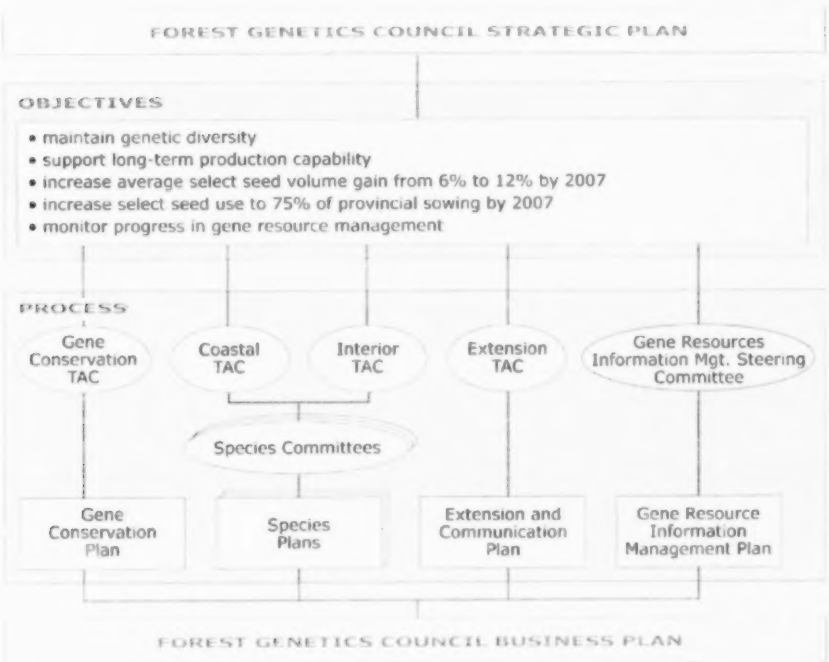

FOREST GENETICS COUNCIL STRATEGIC PLAN
OBJECTIVES
• maintain genetic diversity
• support long-term production capability
• increase average select seed volume gain from 6% to 12% by 2007
• increase select seed use to 75% of provincial sowing by 2007
• monitor progress in gene resource management
PROCESS
Gene Conservation TAC
Coastal TAC
Interior TAC
Extension TAC
Gene Resources Information Mgt. Steering Committee
Species Committees
Gene Conservation Plan
Species Plans
Extension and Communication Plan
Gene Resource Information Management Plan
FOREST GENETICS COUNCIL BUSINESS PLAN

Figure 1
The link between FGC objectives, planning processes, and the FGC Business Plan.

[1] Seed planning units are groupings by species, seed zone, and elevation band. They are logical units for the planning and management of tree breeding and seed production. Appendix 1 lists the 43 SPUs (42 for planning purposes) in the provincial forest gene resource management program that are targeted for investment in genecology, breeding, and orchard development.

1.2 Forest Investment Account Tree Improvement Program

"Council's Business Plan coordinates Forest Investment Account spending with cooperator investments and activities."

The Tree Improvement Program (TIP) is part of the provincially delivered Forest Investment Account (FIA). FIA promotes sustainable forest management in British Columbia, and includes three major objectives:

- Foster sustainable forest management
- Improve the public forest asset base
- Promote greater returns from the utilization of public timber

Forest Investment Account TIP investments are organized and managed by the FGC and its subcommittees. Council business planning coordinates and leverages FIA TIP investments with other cooperator investments.

Activities in the FGC Business Plan are organized into six subprograms (Figure 2):

- Gene Conservation
- Tree Breeding
- Operational Tree Improvement (OTIP)
- Expansion of Orchard Seed Supply (SelectSeed Ltd.)
- Extension and Communication
- Gene Resource Information Management

FIA Funding

"FIA - TIP annual budgets are based on recommendations from the Forest Genetics Council."

TIP annual budget allocations are based on recommendations from the FGC as developed in the FGC Business Plan, and are subject to budgeting and approval processes of the Forest Investment Council and the Ministry of Forests.

During the 2002/03 fiscal year, the FIA-funded forest gene resource management activities identified in the FGC Business Plan were delivered through three administrative mechanisms:

- Ministry of Forests/University of BC Contribution Agreement
- Direct Ministry of Forests Tree Improvement Branch Administration
- Ministry of Forests/SelectSeed Company Ltd. Multi-Year Agreement

The subprograms associated with each of the agreements are shown in Figure 3.

Figure 2
Relationship between FGC strategic and annual business plans, Forest Investment Account TIP, and participants in gene resource management activities.

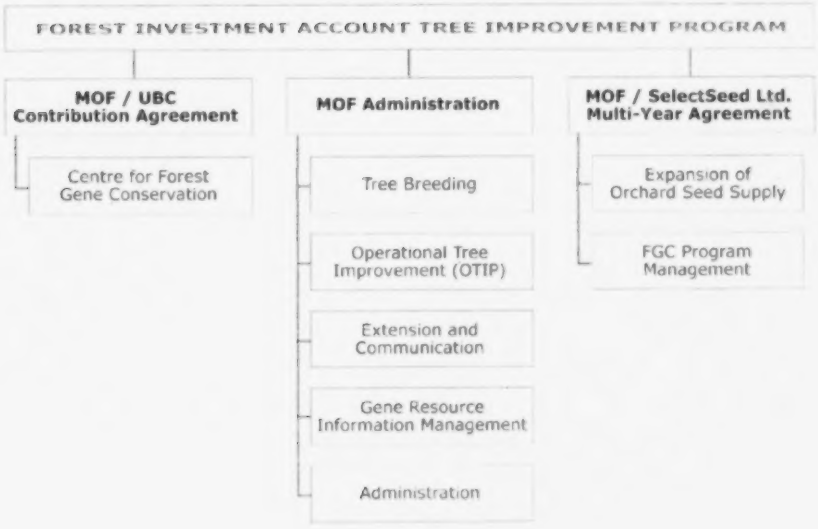


Figure 3
Funding agreements for the delivery of the Forest Investment Account – TIP.

> *Activities are monitored for performance and progress towards long-term program objectives.*

Monitoring and Reporting

Activities undertaken in the delivery of the FGC Business Plan are monitored for performance relative to specified criteria, and for progress towards long-term program objectives. Performance is planned, monitored, and reported using performance indicators (PIs). These indicators are logical measures of work such as "number of grafts made" or "number of ramets planted." The types of work done under each subprogram are organized under a work breakdown structure (WBS) shown in Figure 4. PIs are not feasible for all types of work, and reports are written for technical support, gene conservation, extension, communication, and administrative activities.

Figure 4
Work breakdown structure for program organization, management, and monitoring.

2.0 FIA Tree Improvement Program 2002/03

2.1 Budgets and Expenditures

Forest Investment Account Tree Improvement Program allocations and expenditures for the 2002/03 fiscal year are shown in Table 1. The table does not include the in-kind, staff, and other substantial inputs by industry, MOF, and university cooperators who contribute to the success of gene resource management activities in BC.

Subprogram	Budget ($)	Expenditures ($)
Gene Conservation	250,000	250,000
Tree Breeding	1,981,000	2,023,017
Operational Tree Improvement Program (OTIP)	1,129,500	1,036,044
Extension and Communication	94,500	63,391
Gene Resource Information Management	145,000	123,072
Administration and Exec. Secretariat	300,000	274,359
Subtotal	3,900,000	3,769,883
Expansion of Orchard Seed Supply (SelectSeed Ltd.)	1,900,000	1,904,777*
Forest Investment Account Tree Improvement Program Contribution	**$5,800,000**	**5,674,660**

* SelectSeed expenditures include $4,709 interest received. An additional $2,030,000 was received by SelectSeed as an Accountable Advance under the Multi-Year Agreement. These funds will be expended on approved activities prior to March 31, 2005.

Table 1
Summary of Forest Investment Account TIP subprogram budgets and expenditures for the period April 1, 2002 through March 31, 2003

2.2 Gene Conservation Subprogram

Key to any forest genetic resource management program is the maintenance of genetic diversity to allow species to adapt to future biotic and abiotic challenges, and for genetic selection for new traits of economic interest in the future. Most of Council's gene conservation objectives are met through the Centre for Forest Gene Conservation (CFGC) in the Faculty of Forestry at the University of British Columbia. The CFGC has completed three years of a seven-year Gene Conservation Plan that includes developing effective strategies for conserving and monitoring genetic diversity, evaluating current levels of protection of genetic resources, and investigating levels and patterns of genetic diversity in native species.

> "Maintaining gene diversity is a necessary component of long-term forest management"

Accomplishments of the CFGC in 2002/03 included:

- completion of a report on *in situ* gene conservation status of eleven commercially important conifers in British Columbia
- revision of species distribution maps for determining *in situ* gene conservation status (phase 1) for 39 'minor' tree species in BC
- initiation of a study entitled 'Adapting forest gene resource management to climate change' funded by an NSERC/BIOCAP Canada Foundation Strategic Grant
- completion of Geographic Information System queries to the Seamless Forest Cover Inventory and related databases for the initiation of phase 2 assessment of *in situ* conservation status of tree species in BC
- initiation of a study of the relationship between inbreeding and blister rust resistance in whitebark pine
- establishment of a range wide study of adaptation and genecology of whitebark pine
- completion of sampling and laboratory analysis, near-completion of data analysis and preparation of a draft manuscript for a project on efficient sampling strategies for capturing rare alleles in *ex situ* collections
- development of microsatellite markers for western hemlock for a project developing marker-based methods of monitoring and managing co-ancestry in breeding populations
- presentation of ongoing CFGC activities and project results at provincial, national and international meetings, conferences and workshops
- update of the CFGC website (www.genetics.forestry.ubc.ca/cfgc)

2.3 Tree Breeding Subprogram

"Tree breeding programs seek to reveal genetic diversity patterns, and use this information to select parent trees for the production of seed of high genetic quality"

The Tree Breeding Subprogram seeks to continually improve the genetic worth (GW)[4] of seed and vegetative materials for reforestation. Tree breeding activities include selecting parents in wild stands, propagation, testing offspring, mating, establishing/maintaining/measuring trials, and associated research. The Tree Breeding Subprogram also includes applied genecology[5] to support the information needs of SPU programs as described in Species Plans. FGC Interior and Coastal TACs and their associated Species Committees carry out planning for the Tree Breeding Subprogram. The MOF Research Branch manages and undertakes Tree Breeding Subprogram activities.

[4] Genetic worth is a measure of the genetic quality of a seed or vegetative lot over wild stand material, measured for a specific trait (e.g., growth, wood density, pest resistance).

[5] Genecology is the relationship between genetic diversity and environments.

Figure 5 shows the allocation of effort to Tree Breeding Subprogram activities in 2002/03. Figure 6 compares the work completed under each activity to work planned for the fiscal year.

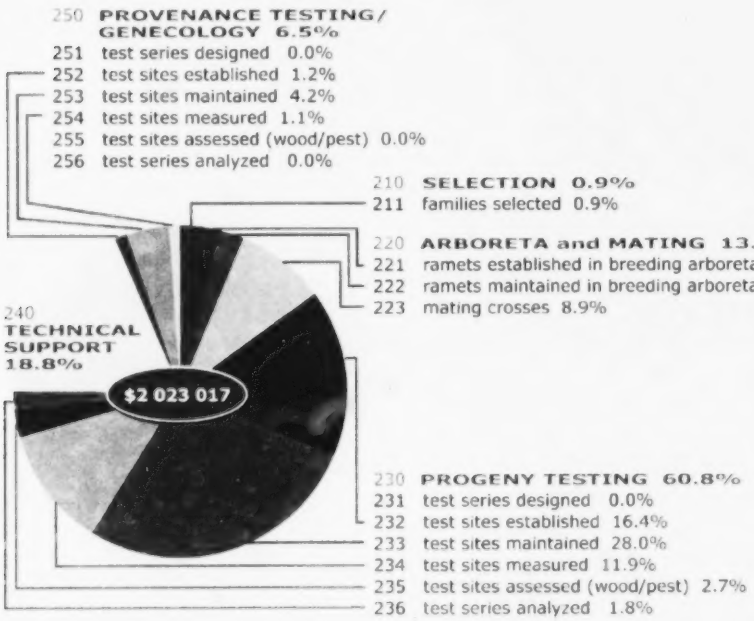

250 PROVENANCE TESTING/ GENECOLOGY 6.5%
251 test series designed 0.0%
252 test sites established 1.2%
253 test sites maintained 4.2%
254 test sites measured 1.1%
255 test sites assessed (wood/pest) 0.0%
256 test series analyzed 0.0%
210 SELECTION 0.9%
211 families selected 0.9%
220 ARBORETA and MATING 13.0%
221 ramets established in breeding arboreta 1.6%
222 ramets maintained in breeding arboreta 2.5%
223 mating crosses 8.9%
240 TECHNICAL SUPPORT 18.8%
$2 023 017
230 PROGENY TESTING 60.8%
231 test series designed 0.0%
232 test sites established 16.4%
233 test sites maintained 28.0%
234 test sites measured 11.9%
235 test sites assessed (wood/pest) 2.7%
236 test series analyzed 1.8%

Figure 5
Tree Breeding Subprogram allocation of effort, 2002/03.

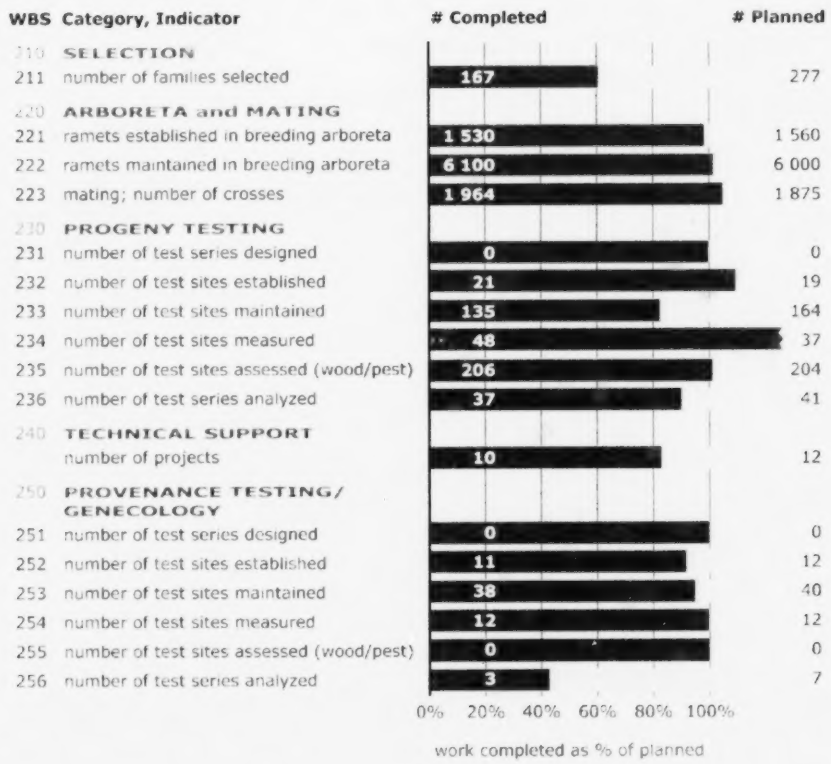


Figure 6
Tree Breeding Subprogram progress, 2002/03.

"Trees of high genetic quality are selected for seed production in seed orchards"

Progress in Operational Breeding

Operational breeding program objectives were again met or exceeded for most seed planning units (SPUs) for this fiscal year. There were some shortfalls in program delivery largely due to budget constraints (i.e., establishment of polymix tests and wood chemistry screening in western redcedar). Second generation breeding in most programs was a major activity, and is nearing completion for all Sitka spruce, lodgepole pine, and western hemlock seed planning units. Some populations for other species are also nearing completion. Field programs for 2nd generation (F1 full-sib) populations are well underway, and new selections could be made as early as 3 years from now in interior spruce and western hemlock. Several seed transfer issues were dealt with using breeding program data, allowing for more appropriate use of orchard seed. Extensive lodgepole pine seed orchard developments by Council through SelectSeed Company Ltd. were supported by parent selections and large scion collection efforts. These developments culminate first-generation (open-pollinated) testing for most lodgepole pine SPUs.

[6] F1 - full-sib populations are the first generation of pedigree families where both parents of all offspring are known and selected for specific desirable traits.

Technical Support

Technical support activities advance breeding programs and assist with the transfer of breeding program gains to orchard production.

These projects included work in areas such as:

- realized-gain trials to correlate progeny test gain estimates with area-based yield and with growth models,
- relationships between growth and wood density,
- studies to determine the impacts of inbreeding on growth,
- research to better understand the mechanisms of pest resistance, and
- correlations among growth and resistance traits.

Realized-gain trials established in previous years for coastal Douglas-fir and western hemlock are verifying genetic gain predictions, and providing important information on interactions among site index, stand density, and inherent growth rate. The results from several tests are still showing predicted gains are on track with realized gains. However, the most interesting results will come when severe stand competition occurs. Inbreeding studies continue with western redcedar, as a model species for the effects of inbreeding in wild and selected populations (e.g., seed orchards, and test inbred and outbred lines). These studies are increasing our understanding of the deleterious impacts of inbreeding on redcedar growth and diversity, and of how to avoid inbreeding in both orchard and wild-stand seed collections. As well, strong research contributions were made in support of the lodgepole pine seed-set issue, and important recommendations for increasing seed yield were provided to orchard managers.

> *"Realized-gain trials correlate progeny test gain estimates with area-based yields and with growth models"*

Provenance Testing and Genecology

Provenance testing and genecology work is primarily focused on SPUs where past testing was not done, or where it was insufficient to clearly locate seed zone boundaries. Some work may also identify superior provenances for seed collection.

Objectives in these categories were generally met. Tests of Pacific silver fir were established and measured to continue important work for this species. Other work with Douglas-fir in the submaritime seed zone is beginning to show patterns of genetic diversity, and has allowed decisions concerning orchard development and seed movement. Projects with western redcedar and yellow-cedar have also progressed, leading towards decisions on elevation limits for the transfer of seed, and on boundary location between the maritime and submaritime seed zones.

> *"Provenance tests help us understand geographic patterns of genetic diversity"*

2.4 Operational Tree Improvement (OTIP) Subprogram

"OTIP focuses on increasing the quality and quantity of seed produced from existing seed orchards."

The OTIP Subprogram focuses on increasing the quality and quantity of select seed produced from existing forest company and MOF seed orchards. It also provides technical support to improve orchard production and management, including pest management.

OTIP funding is based on Species Plansprojects are developed through a call-for-proposals process based on Species Plan priorities. FGC Review Committees rank all proposals against FGC objectives and SPU priorities, based on technical merit, impact, value, and cost. The MOF Tree Improvement Branch administers the OTIP on behalf of Forest Investment Account and the FGC.

Figure 7 shows the allocation of funding to OTIP Subprogram activities in 2002/03. Figure 8 compares the work completed under each activity to work planned for the fiscal year.

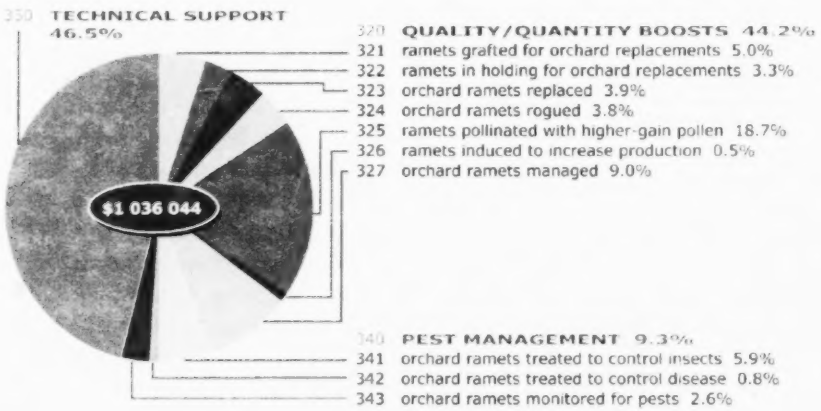

350 TECHNICAL SUPPORT 46.5%
$1 036 044
320 QUALITY/QUANTITY BOOSTS 44.2%
321 ramets grafted for orchard replacements 5.0%
322 ramets in holding for orchard replacements 3.3%
323 orchard ramets replaced 3.9%
324 orchard ramets rogued 3.8%
325 ramets pollinated with higher-gain pollen 18.7%
326 ramets induced to increase production 0.5%
327 orchard ramets managed 9.0%
340 PEST MANAGEMENT 9.3%
341 orchard ramets treated to control insects 5.9%
342 orchard ramets treated to control disease 0.8%
343 orchard ramets monitored for pests 2.6%

Figure 7
OTIP Subprogram allocation of effort, 2002/03.

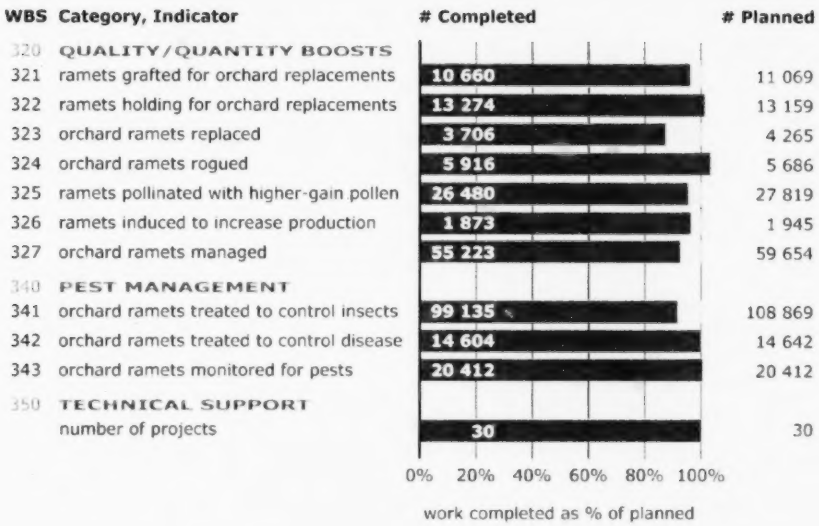


Figure 8
OTIP Subprogram progress, 2002/03.

Quality/Quantity Boosts

Several techniques are used to improve the genetic quality and/or quantity of orchard seed. New selections from breeding programs are grafted for planting in seed orchards to replace the lower-gain ramets and improve the genetic worth of seed orchard seed. Supplemental mass pollination (SMP) and controlled pollination (CP) are used to apply high quality pollen to increase both seed production and genetic worth. Orchard ramets are induced through hormonal treatments or cultural treatments (i.e., girdling) to produce more reproductive buds. Seed-orchard and holding-bed ramets are managed to control crown growth and shape, and weeds, and to maintain identities. The following progress was made on specific activities during 2002/03.

WBS 321: 96% of grafting for the replacement of stock in existing orchards was completed as planned. One project had some field mortality due to poor scion material in coastal white pine selections.

WBS 322: Over 100% of the planned number of orchard ramets were kept in holding beds. The large number was due to some ramets not developing sufficiently to be planted out in orchards.

WBS 323: 87% of planned orchard replacement was done. Some grafts developed poorly and had to remain in holding beds. There was also some mortality in some of grafts produced.

WBS 324: Over 100% of planned orchard roguing was carried out as planned. The availability of information on current clones allowed for more aggressive roguing.

WBS 325: 95% of planned SMP and CP projects were carried out. Most orchards produced large crops in 2002. However, projects in three orchards were not initiated due to the lack of crops.

> *"Techniques to improve the genetic quality and quantity of orchard seed include introducing new selections from breeding programs, using high quality pollen, and inducing ramets to produce more reproductive buds."*

WBS 326: 96% of planned ramet induction of reproductive buds was completed. Treatments were deferred in one orchard due to poor health in a small portion of the ramets to be induced.

WBS 327: Nearly 93% of the planned number of ramets in orchards and holding beds were managed to control crown growth and shape, control weeds, and maintain identities.

Pest Management

Insects and disease can damage cones or reduce the vigour and cone production of orchard ramets. Treatments to control insects and disease are only undertaken when needed. Orchard ramets are monitored for pest problems for early detection and effective control.

WBS 341: 91% of those planned insect control treatments were done. There were fewer insect problems than anticipated and some treatments were cancelled.

WBS 342: 99.7% of planned disease control treatments were carried out.

WBS 343: Some 20,412 ramets (100% of planned) were monitored for insect and disease problems.

Technical Support

"*Technical support projects investigate ways to improve the production of high-quality seed.*"

Seed orchard technical support projects are designed to remove barriers to producing seed of high quality for operational use.

WBS 350: Twenty five technical projects addressed priority issues, including seed-set problems in southern lodgepole pine orchards, pest management measures, pollen management to improve genetic worth and seed production, and orchard management techniques. This year saw the successful culmination of several years of intensive work to identify the causes of poor seed set in lodgepole pine in north Okanagan seed orchards and recommend appropriate actions. Based on this technical work, Council's Interior TAC concluded that the problems causing poor seed set in pine are manageable, and recommended that new lodgepole pine seed orchards should be developed in the north Okanagan to take advantage of strong and reliable cone production and the absence of contaminating pollen.

2.5 Expansion of Orchard Seed Supply Subprogram (SelectSeed Company Ltd.)

Seed orchard expansions required to meet FGC objectives, and not undertaken by other companies or agencies, are done through SelectSeed Company Ltd. (SelectSeed), a corporation wholly owned by the B.C. Forest Genetics Society and reporting to Council. SelectSeed also provides program management services to the FGC.

"SelectSeed's investments are based on the planning processes led by Council"

SelectSeed's Business Plan and investments are based on the long-term and annual business plans prepared by FGC TACs and Species Committees. Management discretion lies with the SelectSeed Board of Directors, and is guided by the terms of the multi-year agreement between SelectSeed and the province of BC. Agreements between private orchard companies and SelectSeed take the form of long-term contracts that provide stability for investment and orchard management. The SelectSeed Business Plan is reviewed and approved annually by the FGC.

SelectSeed Mission Statement

SelectSeed supports Forest Genetics Council objectives for the development of seed orchard facilities to meet the provincial demand for high quality, ecologically adapted tree seed through investments, cooperative work with FGC members, and effective program management.

Figure 9 shows funding allocations to Expansion of Orchard Seed Supply Subprogram activities in 2002/03. Figure 10 compares the work completed under each activity to work planned for the fiscal year.

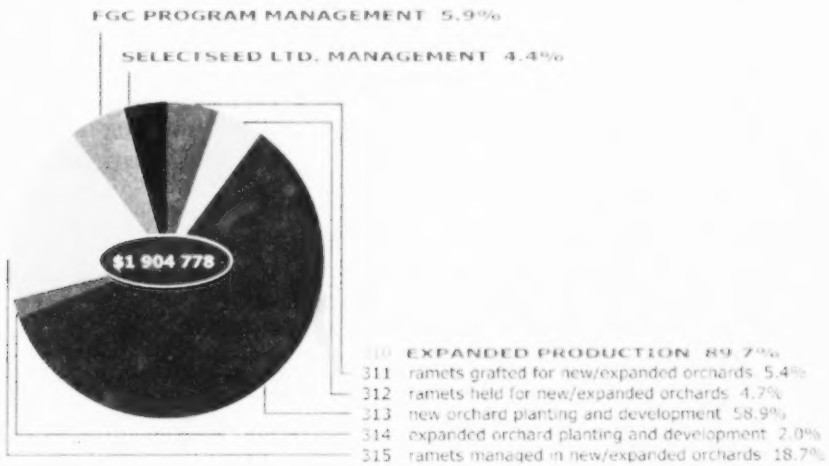

FGC PROGRAM MANAGEMENT 5.9%
SELECTSEED LTD. MANAGEMENT 4.4%
$1 904 778
310 EXPANDED PRODUCTION 89.7%
311 ramets grafted for new/expanded orchards 5.4%
312 ramets held for new/expanded orchards 4.7%
313 new orchard planting and development 58.9%
314 expanded orchard planting and development 2.0%
315 ramets managed in new/expanded orchards 18.7%

Figure 9
Expansion of Orchard Seed Supply Subprogram allocation of effort, 2002/03.

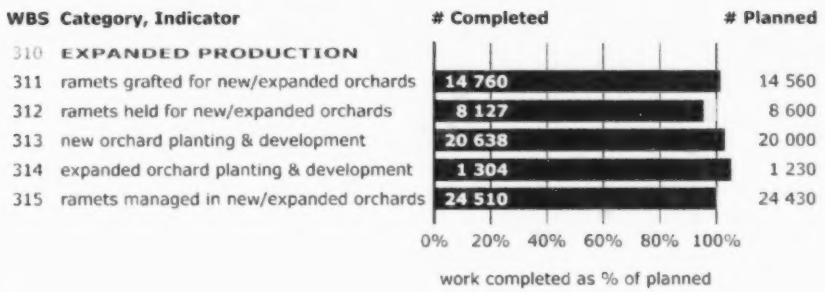


Figure 10
Expansion of Orchard Seed Supply Subprogram progress, 2002/03.

"In its third year of operation, SelectSeed focused on the establishment of 9 lodgepole pine seed orchards"

Expanded Orchard Production

The expansion of orchard seed production capacity involves the propagation of selected parent trees through grafting, orchard site development, and the planting and management of grafted trees in orchards. These activities were carried out by SelectSeed through contracts to orchard companies. All activities were undertaken to meet objectives in the FGC Business Plan.

Following the ITAC recommendation to establish lodgepole pine seed orchards in the north Okanagan area, SelectSeed initiated a request-for-proposal process that resulted in long-term contracts for an additional 4 seed orchards that will supply seed to the Bulkley Valley low, Prince George low, and Central Plateau low seed zones. These orchards will total 13 071 ramets and will cover approximately 33 hectares. This brings to total complement of SelectSeed-developed orchards to 14, with a total of over 35 000 ramets.

Site development and some planting of these new orchards took place during 2002/03. Establishment of the other nine SelectSeed orchards continued, with a total establishment for the year of nearly 22 000 ramets.

The following activities were carried out in 2002/03.

WB 311: 14 760 grafts were made during 2002/03 were for new lodgepole pine and spruce orchard development.

WBS 312: Some 8 127 ramets for new or expanded orchards were held until orchard sites were ready for outplanting. Backlog holding was substantially reduced as orchard developments proceeded.

WBS 313: 20 638 ramets were planted in new orchards. This was the single largest year of orchard development.

WBS 314: 1 304 ramets were planted in expansion orchards.

WBS 315: Some 24 510 ramets established in orchards prior to April 1, 2003 were managed during the year.

SelectSeed Ltd. Management

SelectSeed activities in 2002/03 included:

- organizing and managing contracts for the propagation and holding of stock
- developing orchard contracts, including bidding processes, contract negotiation, preparation of contract language, and records maintenance
- preparing an annual Business Plan covering business procedures, budgets, and long- and short-term activities
- reporting to Forest Investment Account administrators on accounts and activities
- managing accounts and corporate business.

FGC Program Management

FGC program management activities included developing the FGC Business Plan for 2002/03; organizing committee work for development of the 2003/04 FGC Business Plan; policy, committee, issue management, and reporting for the FGC; and financial management of the overall FIA Tree Improvement Program.

2.6 Extension and Communication Subprogram

> *ETAC supports FGC goals and objectives through extension, communication, and education activities.*

The Extension and Communication Subprogram supports FGC goals and objectives through extension, communication, and education activities. These activities are developed and guided by the FGC Extension Technical Advisory Committee (ETAC), which includes representatives from government and industry seed orchards, forest companies, seed dealers, academia, researchers, and consultants. The ETAC prepares an annual activity plan. Extension activities provide technical information and training to users, specialists, and decision-makers. Communication activities develop information for tree improvement and public audiences.

Extension and communication contracts were administered by the MOF Tree Improvement Branch .

Figure 11 shows funding allocations to the Extension and Communication Subprogram activities in 2002/03.

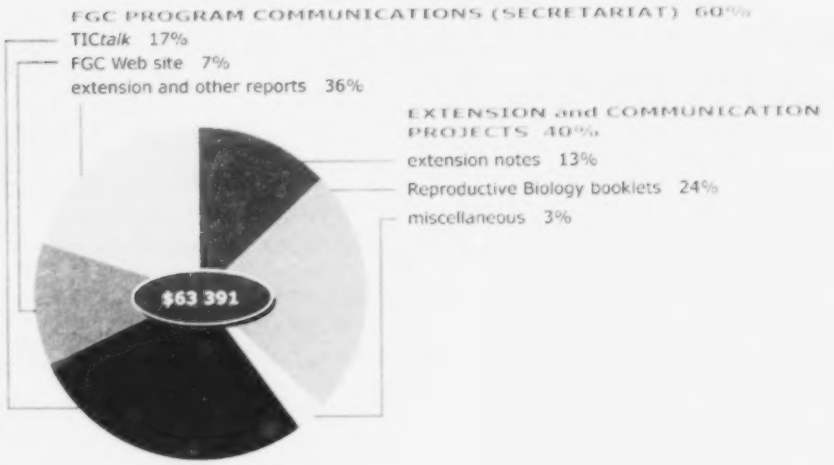


Figure 11
Extension and Communication Subprogram allocation of effort, 2002/03.

FGC Program Communications

FGC communications focus on activities pertinent to the provincial forest gene resource management program. In 2002/03 these included the preparation of annual plans, reports, and display materials; maintenance of the FGC Web site; and production of TIC*talk*, Council□s periodic newsletter. The FGC Secretariat carried out these program-level communication activities.

Extension and Communication Projects

FGC cooperators undertook a range of extension, communication, and education activities based on an annual plan and call for proposals.

The ETAC funded two types of extension and communication activities in 2002/03:

- *Extension notes* (5): Subject matter experts were asked to review activity in their fields under the Operational Tree Improvement Program (1998 2001) and prepare summary reports highlighting accomplishments. Draft reports were received for editing and subsequent publication.
- *Technical Reports (2):* Draft technical reports were produced on the reproductive biology of white pine and lodgepole pine.

In 2002/03, the ETAC conducted a strategic review and created a position to coordinate the implementation of projects in the 2002/03 activity plan. Activities will remain under the guidance of the FGC, while implementation will be carried out by a Coordinator under the direction of the ETAC Chair.

2.7 Gene Resources Information Management Subprogram

"The Gene Resources Information Management Subprogram develops computer-based information systems to assist seed users."

The Gene Resource Information Management Subprogram supports the development of web-based information management and planning tools. These tools will improve client access to gene resource information needed for reforestation and for the practice of sustainable gene resource management. Projects supported under this subprogram also include the development of gene resource spatial data to support client access to seed planning and gene resource management maps (e.g. seed collection, deployment and gene conservation activities).

A Steering Committee develops Gene Resource Information Management activities and budgets. The Committee comprised of MOF tree improvement, research, and systems staff, industry representatives, and the FGC Program Manager identifies projects and sets priorities for FGC approval. The Tree Improvement Branch administers the subprogram on behalf of the ministry's Forest Investment Account (FIA).

SPAR Web-based Application

Support for two web-based systems projects, the Seed Planning and Registry system (SPAR) and SeedMap, continued in 2002/03. The MOF and the Forest Investment Account (FIA) jointly funded the phased-in development of the web-based SPAR and SeedMap applications. FIA funded on-line Help, LearnLink training modules, tutorials and extension material (rackcard). Further development of gene resource spatial data, update methodologies and analyses were also funded under FIA (Figure 12).

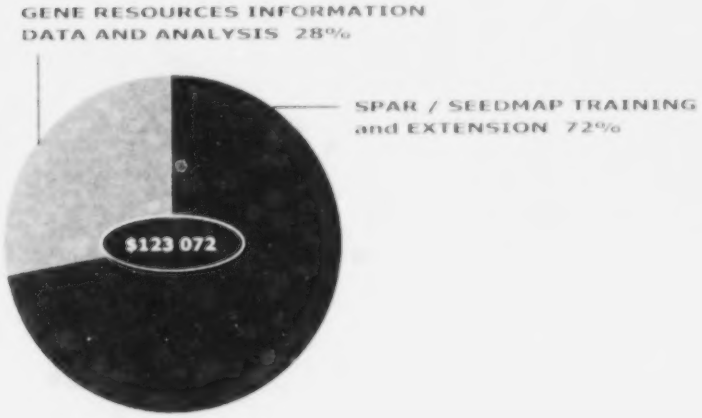


Figure 12
Gene Resource Information Management allocation of effort, 2002/03.

[7] This subprogram, initially established to address the need for a SPAR systems upgrade within two years, has been extended to allow longer-term information management planning, development, and implementation.

The SPAR project will convert the existing mainframe application and database to a Web-based application. This upgrade will simplify access to SPAR, improve users' ability to screen seed availability, and assist clients in monitoring seed use, deployment, and genetic quality across the province.

SeedMap

SeedMap is a web-based mapping system that will provide direct access to seed planning maps and summary reports. With SeedMap, clients will be able to assess current and projected seed needs, and develop appropriate cone collection and seed supply access plans. SeedMap will also facilitate the integration of seed planning and tree improvement information (spatial and other) with initiatives such as land use planning, timber supply reviews, integrated silviculture planning, and forest certification programs.

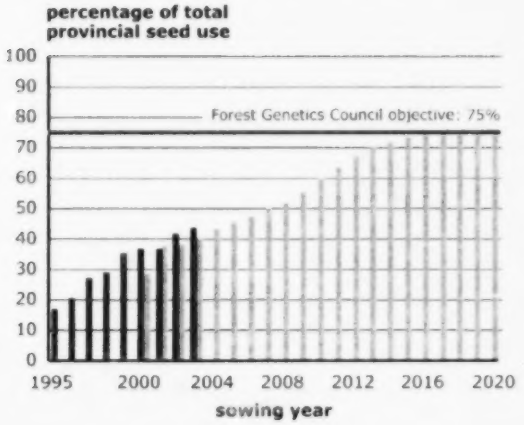
2.8 Administration

Administration of Forest Investment Account Tree Improvement Program funding is carried out by the MOF Tree Improvement Branch, and includes financial, monitoring, and reporting services. The administrative infrastructure for the Tree Breeding, OTIP, Extension and Communication, and Gene Resource Information Management subprograms is provided directly. Administration of the Gene Conservation and Orchard Expansion subprograms is carried out through contract management. Administrative services provided by the Tree Improvement Branch also included managing a contract for Executive Secretariat services to Council. The Executive Secretariat supported Council's day-to-day business, communication, and planning activities.

3.0 Provincial Progress Indicators

Two of the principle objectives set by Council in its 1998 Strategic Plan are to increase the average volume gain (genetic worth for growth, or GWg) of select seed to 12%, and to increase select seed use to 75% of total provincial sowing by 2007. Figures 13 and 14 show, respectively, actual and forecast values for orchard seed/rooted cutting production and GWg for the period 1995-2023. During the 2002/03 fiscal year, Council began the process of updating it's strategic plan. This will include setting new provincial-level objectives for seed use and gain, with the year 2020 as the planning horizon. Forecasts indicate that the FGC objective for GWg will be met by the 2007 target (Figure 14); however, projections for seed use (Figure 13) will not be met until about 2016.

Figure 13
Actual and Species Plan forecasts of orchard seed production as percentage of provincial seed use.

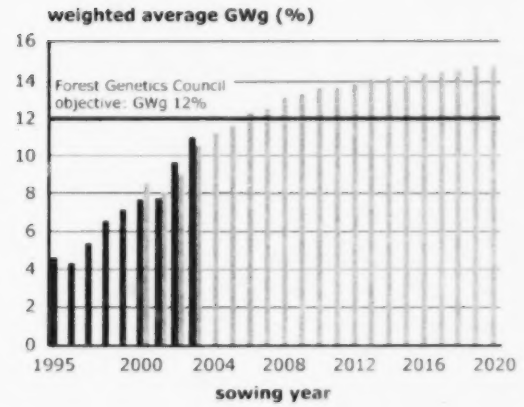


Sowing factor adjustments are included.

Production forecasts are adjusted to the year in which seed will be available for sowing (year of production plus two years). "Sowing years" run from July 1 to June 30; the 2003 sowing year begins July 1, 2002.

Historic seed production and genetic worth data are from the Seed Planning and Registry system (SPAR) operated by the MOF Tree Improvement Branch.

Figure 14
Actual and Species Plan forecasts of average genetic worth for growth (GWg) of orchard seed in BC



[8] Until 2001, the term "select seed" referred to orchard seed with GW > 0. In 2001, the definition was expanded to include B+ seed (GW > 0). As a result, actual values in Figures 15 and 16 for 2000 and beyond include a small amount of B+ seed. All other values include only orchard seed.

During the 2003 sowing year, select seed use increased to 44% from 42% the previous year (Figure 13). Most of this increase was due to higher availability of orchard seed for spruce and lodgepole pine in interior seed planning units. Provincially, the use of orchard seed increased to 84.3 million seedlings from 81.9 million the previous year. The use of B+ (superior provenance) seed also increased, to 10.3 million from 8.2 million in 2002.

Projected use of orchard seed and rooted cuttings will fall short of the objectives set by the FGC in its 1998 Strategic Plan due primarily to delays in the establishment of lodgepole pine seed orchards. These orchards are now fully established or in the process of establishment through SelectSeed Company Ltd., and seed production will increase steadily over the next 6 to 10 years.

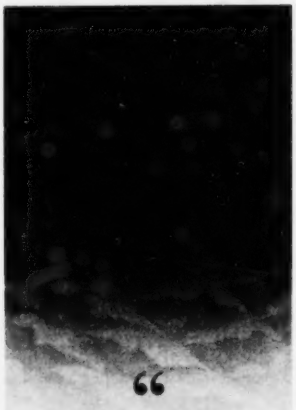
Breeding and orchard programs for three high elevation lodgepole pine seed planning units (NE high, PG high, EK high) have not proceeded due to insufficient resources. Work on Pacific silver fir in the Maritime seed zone has not proceeded due to technical difficulties with orchard seed production. It is anticipated that these four programs will focus only on genecology and gene conservation in future years.

Projections for the average GWg of orchard seed used are on target to meet FGC objectives by 2007 (Figure 14), and are exceeding projections compiled from species plans. These gains reflect the focused effort of seed orchard managers to upgrade seed orchards, and of tree breeders to provide recommendations and improved materials. The OTIP subprogram is instrumental in supporting this continual upgrade of orchards. Average GWg will continue to rise as old seed orchards are replaced with the best available selected material from breeding programs.

During 2002/03, site developments to expand provincial seed orchard capacity by about 25% over present levels were put in place by SelectSeed Company Ltd. As of March 31, 2003, over 23 000 new ramets were planted in these orchards. This number is expected to rise to over 35 000 over the next two years. These developments are a milestone in BC tree improvement programs. In combination with industry and Ministry of Forests seed orchards, they will bring total provincial orchard capacity to the level needed to meet FGC long-term objectives.

3.1 2002 Seed Orchard Crops

In 2002, all provincial orchards produced a combined crop of over 2400 kilograms of seed; sufficient to grow approximately 400 million seedlings (Appendix 2). Interior spruce crops were very large, and accounted for over half the provincial total. Western larch crops were also good. Interior lodgepole pine orchards continue to mature and produce both more cones and higher seed yields. Coastal orchards had medium to low crops for the year.



Forest gene resource management includes the conservation, controlled use, and enhancement of genetic resources of forest tree species.

4.0 Cooperator Activities 2002/03

The provincial forest gene resource management program involves cooperators in the forest industry, two levels of government, universities, private research companies, and individual contractors (Table 2). Many of these groups participate in the work of the Council, its TACS, and Species Committees.

The Ministry of Forests is primarily responsible for tree breeding; the forest industry cooperates in identifying sites for progeny testing and with controlled matings. Private industry leads the operational production of reforestation materials; seven forest products companies, two private companies, and the provincial government own and operate seed orchards.

Under the direction of the FGC, SelectSeed Company Ltd. is substantially expanding seed orchard capacity. These expansions are all being done with the private sector through long-term contracts, with the sharing of resources and seed produced.

The CFS, MOF Research Branch, and universities undertake research supporting tree improvement, some of which was funded through the Science Council of BC and the Forest Innovation and Investment program.

The University of British Columbia (UBC) leads gene conservation activities through the UBC Centre for Forest Gene Conservation. The Centre is now fully operational.

Category	Name	Orchard	Breeding	Research	Tech. Support	Policy	Planning	Gene Conserv.	Extension	Education
Government	BC Ministry of Forests	•	•	•	•	•	•	•	•	•
	Canadian Forest Service		•	•						
Universities	Simon Fraser University			•	•			•		•
	University of British Columbia			•	•	•	•	•	•	•
	University of Northern BC			•	•	•	•	•	•	•
	University of Victoria			•	•				•	•
Private Companies	Ainsworth Forest Products Ltd.					•	•			
	Canadian Forest Products	•	•		•		•		•	•
	CellFor			•						
	Cortex Consultants Inc.								•	
	Glenviron Consulting								•	
	Pacific Regeneration Technologies	•		•	•		•		•	
	Pope and Talbot Ltd.					•				
	Riverside Forest Products	•	•		•	•	•		•	•
	TimberWest Forest Corp.	•	•		•		•		•	•
	The Pas Lumber Co.	•			•	•	•		•	•
	Vernon Seed Orchard Company[1]	•	•		•		•		•	•
	Western Forest Products	•	•		•		•		•	•
	West Fraser Timber Ltd.	•	•		•		•		•	•
	Weldwood Ltd.	•	•		•	•	•		•	•
	Weyerhaeuser Canada				•		•		•	•
	Yellow Point Propagation	•	•		•		•		•	•

Table 2
Cooperator participation in provincial forest gene resource management program.

"Tree improvement programs must continue to focus on the production of value, and on resource stewardship."

5.0 The Year Ahead

During the period of this report, the Forest Genetics Council and affiliated members were involved in discussions on provincial forest policy changes pertaining to seed use and gene resource management. Many of these changes will come into effect during 2003/04. At this time, gene resource management and seed use policies have not changed significantly, however, as other components of the Results-Based Code come into effect, there will be further review. Members and affiliates of Council will continue to be challenged to provide recommendations, and to work with the Ministry of Forests to ensure policies provide a framework for both stewardship and an efficient operating environment.

Economic difficulties in the BC forest industry will continue to be the most significant challenge to all sectors, including tree improvement programs. Provincial policy changes designed to make the forest industry more competitive, and industry efforts to cut costs and streamline production, serve to put an ever-increasing emphasis on value and efficiency. This increased value focus has resulted in large reductions in some types of silviculture investment. To date, tree improvement has shown good value, and has subsequently retained support from industry and government decision makers. A challenge for tree improvement programs will be to continue to focus on value, and to provide improved seed of high genetic quality at the lowest possible cost. This value focus will also mean not proceeding with activities in areas where return on investment is inadequate.

During 2003/04 Council will complete a new strategic plan that will guide activities over the next 5 to 10 years. This critical process started during the period of this report, but has been slowed by the need to understand and respond to changing forest policies. Council and advisory committee members will be active in completing the new strategic plan during the coming year.

Council recently completed a review of membership and provided recommendations to the Provincial Chief Forester. These recommendations have been accepted, and will be implemented during the 2003/04 fiscal year. The result will be new members on Council, along with new ideas and perspectives. These healthy changes will serve to re-invigorate Council's planning processes, and keep gene resource management and tree improvement programs focused on value and meeting the needs of the provincial forest sector.

6.0 People

FGC Achievement Award

Dr. John Barker

An FGC Achivement Award was presented to Dr. John Barker on June 11, 2002 for outstanding contributions to the technical and organization aspects of forest gene resource management in BC. John's carreer has spanned both industry and academia, including the UBC Faculty of Forestry, where he recently retired as FRBC Chair in Silviculture. He helped establish the original Coastal Tree Improvement Council in 1979, and has been a strong supporter and contributor to the FGC. John's understanding and invovlement in a broad range of policy and technical issues allowed him to bring important and much valued perspective to Council and the structuring of Council business.

Gyula Kiss

On March 5, 2003 Gyula Kiss was presented the FGC Achievement Award by Mr. Larry Pedersen, Provincial Chief Forester. This award recognizes Gyula's pioneering role in forest genetics and tree breeding in BC. Gyula brought the science of tree breeding to the interior of the province in 1967 with the launch of a breeding program for interior spruce. He also played a key role in the establishment of the Kalamalka Research Station and Seed Orchards in Vernon; facilities that are central to interior tree improvement programs today.

Retirements

Dr. Cheng Ying

After 24 years as Provenance Forester with the Ministry of Forests Research Branch, Dr. Cheng Ying retired effective March 31, 2003. Cheng successfully applied his quantitative genetics background to the study of the geographic patterns of genetic variation, genetic pest resistance and climatic impacts on adaptation. This important work provided the technical basis for seed transfer guidelines for all major tree species in BC. Cheng will remain with the Research Branch in a volunteer capacity as a Research Scientist Emeritus.

Dr. Joe Webber

Joe Webber has been a pioneer and leader in conifer reproductive biology in British Columbia throughout his 30-year career. Focusing on pollen management and cone induction, Joe's innovative work has led to greatly improved operational management of sexual reproduction in native conifer seed orchards. Effective March 31, 2003, Joe retired from his position as Research Scientist with the Ministry of Forests Research Branch. He will remain in a volunteer capacity, a Research Scientist Emeritus.

Appendix 1: Seed Planning Units

Seed planning unit (SPU)				
#	Species	Seed zone symbol	Seed zone name	Elevation band (m)
1	Fdc	M	Maritime	< 700
2	Cw	M	Maritime	< 600
3	Hw	M	Maritime	< 600
4	Sx	NE	Nelson	1000-1500
5	Sx	NE	Nelson	> 1500
6	Ss	M	Maritime	< 750
7	Pli	NE	Nelson	< 1400
8	Pw	M/SM	Maritime/Submaritime	< 1000
9	Ba	M	Maritime	< 1000
10	Pli	TO	Thompson Okanagan	< 1400
11	Yc	M	Maritime	< 1200
12	Pli	PG	Prince George	< 1200
13	Lw	NE	Nelson	< 1300
14	Sx	PG	Prince George	< 1200
15	Pw	KQ	Kootenay Quesnel	< 1400
16	Pli	TO	Thompson Okanagan	> 1400
17	Pli	BV	Bulkley Valley	< 1200
18	Pli	CP	Central Plateau	< 900 N of 56°; < 1100 S of 56°
19	Fdc	SM	Submaritime	200-1000
20	Pli	NE	Nelson	> 1400
21	Fdi	NE	Nelson	< 1000
22	Fdi	NE	Nelson	> 1000
23	Sx/Ss	SM/NST	Submar./Nass Skeena Transition	all
24	Hw	M	Maritime	> 600
25	Sx	EK	East Kootenay	< 1700
26	Pli	PG	Prince George	> 1200
27	Cw	SM	Submaritime	200-1000
28	Sx	TO	Thompson Okanagan	1300-1850
29	Pli	EK	East Kootenay	> 1500
30	Sx	TO	Thompson Okanagan	< 1300
31	Fdc	M	Maritime	> 700
32	Pli	EK	East Kootenay	< 1500
33	Cw	M	Maritime	> 600
34	Lw	EK	East Kootenay	800-1500
35	Sx	BV	Bulkley Valley	< 1200
36	Bg	M	Maritime	< 700
37	Fdi	QL	Quesnel	< 1200
38*	Hw	M	Maritime	> 600
39	Fdi	EK	East Kootenay	all
40	Sx	PR	Peace River	650-1200
41	Fdi	PG	Prince George	< 1000
42	Sx	PG	Prince George	> 1200
43	Fdi	CT	Cariboo Transition	< 1100

* SPU 38 has been merged with SPU 3 for planning purposes

Appendix 2: 2002 Seed Orchard Crop Production Summary

Species	SPU	Orch. #	Producer	GWg	HI cones	Kg seed	Estimated # seedl. (x1000)
Redcedar	M low	140	TimberWest	4	14.3	15.9	3,489
Redcedar	M low	184	MOF - Saanich	4	0.7	1.1	245
Redcedar	M low	189	Western Forest Prod.	5	0.3	0.11	30
Red cedar	M low	193	Western Forest Prod.	2	0.6	0.41	116
Coastal Douglas-fir	M low	166	Western Forest Prod.	11	12.7	4.8	136
Coastal Douglas-fir	M low	134	TimberWest	5	22.8	8.4	265
Coastal Douglas-fir	M low	134	TimberWest	11	11.8	5.3	171
Coastal Douglas-fir	M low	149	MOF - Bowser	8	48.3	22.2	738
Coastal Douglas-fir	M low	154	TimberWest	6	18.0	8.6	178
Coastal Douglas-fir	M low	154	TimberWest	8	17.5	9.6	309
Coastal Douglas-fir	M low	154	TimberWest	12	13.5	9.6	243
Coastal Douglas-fir	M low	162	MOF - Bowser	11	56.7	26.1	856
Coastal Douglas-fir	M low	169	Western Forest Prod.	11	14.0	4.6	141
Coastal Douglas-fir	M low	183	TimberWest	12	7.6	4.8	202
Coastal Douglas-fir	M low	185	MOF - Saanich	4	13.6	4.6	160
Interior Douglas-fir	CT all	231	Vernon Seed Orch. Co.	20	4.0	1.3	57
Interior Douglas-fir	QL all	226	Vernon Seed Orch. Co.	9	3.4	1.5	50
Western hemlock	M high	130	TimberWest	3	1.9	1.3	195
Western hemlock	M high	130	TimberWest	5	2.4	1.1	159
Western hemlock	M low	182	TimberWest	15	0.6	0.4	72
Western Larch	EK all	333	MOF Kalamalka	9	132.1	132.1	11,403
Western Larch	NE low	332	MOF Kalamalka	20	57.7	49.5	3,326
Lodgepole pine	BV low	219	Vernon Seed Orch. Co.	11	92.0	17.8	1,697
Lodgepole pine	BV low	228	MOF Prince George	6	18.8	6.8	910
Lodgepole pine	CP low	218	Vernon Seed Orch. Co.	9	18.5	1.8	160
Lodgepole pine	CP low	223	MOF Prince George	6	8.5	2.7	323
Lodgepole pine	NE low	307	MOF Kalamalka	7	27.0	50.8	5,925
Lodgepole pine	NE low	313	PRT	16	17.6	6.2	596
Lodgepole pine	NS low	230	MOF Kalamalka	NA	23.3	9.7	1,275
Lodgepole pine	PG low	203	MOF Prince George	2	4.5	1.8	231
Lodgepole pine	PG low	220	MOF Prince George	6	12.4	3.7	478
Lodgepole pine	PG low	222	Vernon Seed Orch. Co.	10	19.8	2.6	313
Lodgepole pine	TO high	310	Riverside Forest Prod.	10	18.8	4.5	506
Lodgepole pine	TO low	308	PRT	6	51.5	13.3	1,210
Lodgepole pine	TO low	311	Kalamalka	2	48.0	20.9	432
Western white pine	KQ all	609	MOF Skimikin		82.6	55.7	843
Western white pine	M all	174	Canadian Forest Prod.		24.9	8.7	144
Western white pine	M all	175	MOF - Saanich		46.2	33.0	547
Western white pine	M all	403	TimberWest		7.6	3.5	52
Interior spruce	BV low	207	MOF Skimikin	12	40.8	43.4	5,938
Interior spruce	BV low	208	MOF Skimikin	8	34.4	45.9	7,517
Interior spruce	BV low	620	MOF Kalamalka	27	11.9	13.7	2,251
Interior spruce	EK all	304	MOF Kalamalka	25	67.1	78.9	12,826
Interior spruce	NE high	302	MOF Skimikin	5	17.6	20.5	4,047
Interior spruce	NE high	306	MOF Kalamalka	7	65.4	78.9	12,077
Interior spruce	NE mid	301	MOF Skimikin	6	13.8	17.6	2,666
Interior spruce	NE mid	305	MOF Kalamalka	10	62.1	75.0	12,225
Interior spruce	PG low	214	Vernon Seed Orch. Co.	20	731	904.0	114,824
Interior spruce	PG low	205	MOF Skimikin	16	85.6	108.0	16,544
Interior spruce	PG low	206	MOF Skimikin	12	4.8	6.3	1,060
Interior spruce	PG low	209	MOF Kalamalka	17	42.9	53.5	9,901
Interior spruce	PG low	211	Vernon Seed Orch. Co.	25	12.2	5.7	697
Interior spruce	TO high	303	Riverside Forest Prod.	6	42.4	41.5	8,967
Interior spruce	TO low	303	Riverside Forest Prod.	9	36.6	34.8	6,702
Sitka / interior spruce	SM	131	MOF Cobble Hill	2	116.4	90.5	12,303

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